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THE BRYOLOGIST

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NOTES ON NORTH AMERICAN HEPATICÆ. III.

ALEXANDER W. EVANS

WITH PLATE II

In the present paper ten species of Hepaticæ are considered, four of which are tropical Lejeuneæ. The others include two species, *Pallavicinia hibernica* and *Sphenolobus scitulus*, which have been more or less misunderstood by writers. Five of the species discussed are accompanied by critical remarks, but the others are introduced to indicate extensions or restrictions of geographical distribution.

1. PALLAVICINIA HIBERNICA (Hook.) S. F. Gray.

Collected in September, 1911, at Lake Tetachuck, British Columbia, in a boggy meadow, by A. H. Brinkman (*No. 90*), altitude 3400 feet. The preent, species has been cited several times in the literature as a North American plant but most of the records have been based on incorrect determinations and its range is therefore very incompletely known. As long ago as 1838, Nees von Esenbeck, who considered *P. hibernica* a variety of *P. Lyellii* (Hook.) S F., Gray, listed specimens from Newfoundland, which had been sent him by Montagne.[1] The second record is apparently that of Webber,[2] who reported the

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[1] Naturg. der europ. Leberm. **3**: 347. 1838.

[2] Cat. Fl. Nebraska 93. 1890.

EXPLANATION OF PLATE II

SPHENOLOBUS SCITULUS (Tayl.) Steph.

FIG. 1. Part of a stem, dorsal view, × 25.
FIGS. 2 and 3. Leaves spread out, × 25.
FIG. 4. Perichætial bract, × 25.
FIG. 5. Gemmæ, × 300.

The figures were all drawn from specimens collected at Tetachuck Lake, British Columbia, by A. H. Brinkman (*No. 128*).

COLOLEJEUNEA CAMILLI (Lehm.) Evans

FIG. 6. Part of a female plant with a perianth, ventral view, × 50.
FIG. 7. Two leaves with well developed lobules, ventral view, × 50.
FIG. 8. Three leaves with poorly developed lobules, dorsal view, × 50.
FIG. 9. Part of an antheridial branch, ventral view, × 50.
FIG. 10. Apex of a leaf lobe, × 225.
FIG. 11. Apex of a well developed lobule, × 225.
FIG. 12. Perichætial bract with well developed lobule, × 225.
FIG. 13. Apex of lobule of bract, × 225.
FIG. 14. Gemma, × 300.

The figures were all drawn from the Jamaican specimens collected by the writer (*No. 280*).

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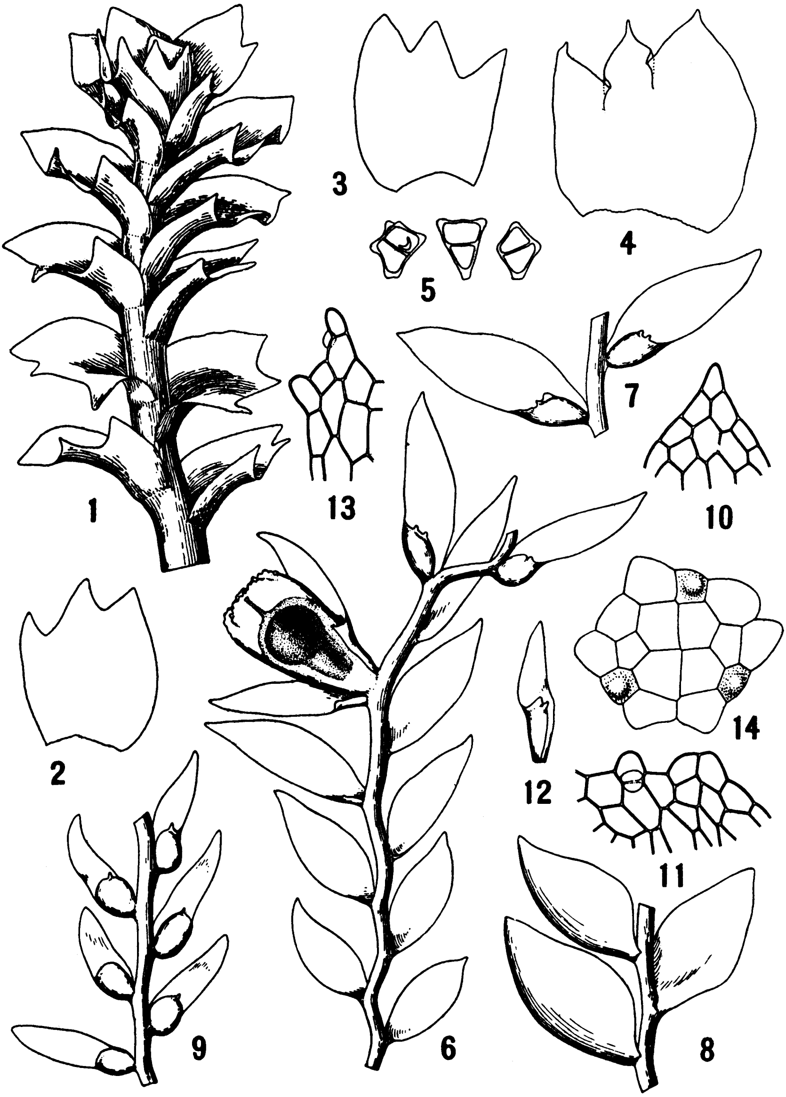

PLATE II

1—5. Sphenolobus scitulus (Tayl.) Steph.
6—14. Cololejeunea Camilli (Lehm.) Evans.

species from Belmont and Dismal River, Nebraska. This record was based on determinations made by Underwood, who soon afterwards catalogued the plant from British Columbia without giving definite localities.[1] A few years later, the writer listed it from Yakutat Bay, Alaska, on the basis of specimens collected by Coville and Kearney, while members of the Harriman Expedition.[2] In 1902, J. Macoun[3] brought together all the records he could find from Alaska and Canada, including one from Huntingdon, Ontario, another from Lake Louise, near Laggan, Alberta, and a third from the vicinity of Griffin Lake, Gold Range, British Columbia. These three records were based on specimens collected by himself and determined by Underwood, and it is probable that the earlier record from British Columbia referred to the Gold Range specimens.

At the time that most of these records were published, *P. Flotowiana* (Nees) Lindb. was considered synonymous with *P. hibernica*, although certain writers recognized it as a variety. In 1899, however, Warnstorf[4] expressed the opinion that the differences between them were sufficient to justify a specific separation, and this view is now held by many recent writers. In 1904, the writer reported *P. Flotowiana* from Massachusetts[5] and referred to this same species the Alaskan specimens which he had previously called *P. hibernica*. Since that time, the specimens from Nebraska, Ontario, Alberta, and the Gold Range have been examined, and these seem also to belong to *P. Flotowiana* rather than to *P. hibernica*. The only records now left for the species are the one from Newfoundland, which ought to be further investigated, and the new one from British Columbia noted above. In northern Europe, *P. hibernica* has a wide distribution, although nowhere abundant.

The differences between *P. hibernica* and *P. Flotowiana* are clearly given by Warnstorf and also by Müller[6] and are almost entirely drawn from the vegetative characters of the gametophytes. In *P. hibernica* the midrib of the thallus, which is triangular in section, is 8–14 cells thick in the middle, while the wings are plane or nearly so. In *P. Flotowiana*, on the other hand, the midrib, which is trapezoidal in section, is 16–22 cells thick, and the wings are more or less crispate. Brinkman's specimens resemble slender forms of *P. Lyellii* and have a similar odor. They are characterized, however, by the frequent forking of the thallus and by the fact that the midrib is uniform in texture. In *P. Lyellii* the thallus almost invariably branches in an intercalary manner from the lower surface of the midrib, while the latter is traversed by a median strand of narrow elongated cells.

2. NARDIA GEOSCYPHUS (De Not.) Lindb.

Collected in May, 1910, near Yarmouth, Nova Scotia, on earth along a roadside, by J. Macoun (*No. 43*). The species is new to eastern Canada but has already been reported in New England from New Hampshire and Massachusetts.[1] It is known also, in North America, from Greenland, Alaska, and British Columbia, and is widely distributed in Europe.

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[1] Zoe **1**: 365. 1891.
[2] Proc. Wash. Acad. **2**: 291. 1900.
[3] Cat. Canadian Plants **7**: 8. 1902.
[4] Allgem. Bot. Zeitschr. 1899: 15.
[5] Rhodora **6**: 165. 1904.
[6] Rabenhorst's Kryptogamen-Flora **6**: 359. 1908.

3. SPHENOLOBUS SCITULUS (Tayl.) Steph. Bull. de l'Herb. Boissier II. **1**: 176. 1902. *Jungermannia scitula* Tayl. Lond. Jour. Bot. **5**: 274. 1846. *Diplophylleia exsectæformis* (Breidl.), var. *æquiloba* Culmann, Rev. Bryol. **32**: 73. *f. 1–8.* 1905. *Sphenolobus exsectiformis,* var. *æquiloba* Culmann; C. Müll. Frib. Rabenhorst's Kryptogamen-Flora **6**: 611. *f. 296.* 1910. (FIGURES 1–5.)

Collected on earth, by A. H. Brinkman, at two stations in British Columbia, namely: Cougas Lake, Nicola River, July, 1910 (*No. 249*), altitude 4400 feet; and Tetachuck Lake, October, 1911 (*No. 128*), altitude 3250 feet. Both specimens are gemmiparous and the second shows weathered perianths. *Sphenolobus scitulus* is a species which has not been very widely accepted by writers. It was originally described from gemmiparous but otherwise sterile material collected by Drummond in North America, nothing more definite about the type locality being stated. In all probability it was somewhere in western Canada. In 1873 Austin[2] reduced the species to synonymy, including it under *Scapania exsecta* (Schmid.) Aust., now known as *Sphenolobus exsectus* (Schmid.) Steph. Pearson[3] accepted Austin's opinion and regarded *Jungermannia scitula* as a form of *J. exsecta* Schmid. in which the leaves were more uniformly tridentate than in typical European specimens. At that time (1890) *J. exsecta* was defined in a rather broad sense and included not only the *S. exsectus* of later writers but also *S. exsectæformis* (Breidl.) Steph., a species porposed by Breidler in 1894, under the name of *J. exsectæformis.*[4] In 1902 Stephani placed the genus *Sphenolobus* upon a definite basis and recognized *S. scitulus* as a species, as well as *S. exsectus* and *S. exsectæformis.* The only specimens which he cited under *S. scitulus* were the original plants of Drummond. At about the same time, however, Macoun[5] listed several Canadian plants under the name *Lophozia exsecta,* var. *scitula* (Tayl.) Pears., stating that the variety was scarcely distinct from the type. Whether these specimens represent the *Sphenolobus scitulus* of the present paper has not yet been determined. When Culmann published his variety *æquiloba* he intimated that he considered it a distinct species, and Müller states that this view may be correct, although he prefers to regard the plant as a variety until more is known about it. Müller cites only three European stations, two of which are in Switzerland and the third in Bulgaria. In studying Brinkman's specimens the writer had the privilege of comparing them with a portion of the type of *J. scitula* from the Taylor herbarium and also with a plant of the variety *æquiloba*, collected by Culmann at the Gemmi in Switzerland, the type locality. All evidently represent the same species.

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[1] See Evans, Rhodora 9: 57. 1907. A full synonymy of the species is given here.

[2] Hep. Bor.-Amer. 21. 1873.

[3] List Canadian Hepat. 21. 1890.

[4] Mitth. d. Naturw. Ver. Steiermark 30: 321. 1894.

[5] Cat. Canadian Plants 7: 23. 1902.

In size *S. scitulus* equals robust forms of *S. exsectus* or *S. exsectæformis*. The plants grow in depressed mats and are dull green, becoming brownish with age. The shoots are prostrate in their older parts and produce rhizoids in abundance; the apical parts, however, especially if gemmiparous, are ascending and develop few or no rhizoids. The stems, which are usually pigmented with purplish brown, are about 0.3 mm. in diameter and extend for long distances without branching.

The leaves are more or less imbricated and spread obliquely (FIG. 1). The line of attachment of a leaf consists of two parts, which form a broad angle with each other. The dorsal part is short and transverse, while the ventral part is longer and directed obliquely forward, thus making the leaves succubous. When spread out flat the leaves appear oblong-quadrate (FIGS. 2, 3) and measure about 1 mm. in length and 0.9 mm. in width. At the broad apex they are subequally three-lobed for about one-fourth their length. The lobes vary from acute to obtuse and the sinuses separating them are rounded. When a leaf is still attached to the stem it is usually complicate with a rounded keel, the ventral portion with two lobes corresponding to the longer ventral portion of the line of attachment. In some cases, however, the keel is practically obsolete and the leaf appears explanate. Under these circumstances the transverse attachment at the dorsal base shows that the plant is a *Sphenolobus* rather than a *Lophozia*. The leaf cells average about 25 μ along the margin of the leaf and about 28 μ in the median and basal portions; sometimes they are a little longer than broad. The trigones are well developed and occasionally confluent. In most cases they are triangular with more or less bulging sides. Underleaves are not present.

As in most if not in all members of the genus, *S. scitulus* is dioicous. The perichætial bracts are more closely crowded than the ordinary leaves and are somewhat larger, measuring about 1.3 x 1.2 mm. The ventral lobe tends to be a little larger than the other two, the sinuses are sharp, and the apices of the lobes are acuminate or even cuspidate (fig. 4). In one instance a lobe was observed in which a sharp lateral tooth was developed near the apex. There are no bracteoles. The perianth, which measures about 3 mm. in length and 1 mm. in diameter, is cylindrical, although sometimes slightly dilated in the basal half. In the upper portion it is four- or five-plicate with rounded keels, the latter becoming more pronounced toward the apex, which is not markedly contracted. The mouth is irregularly and not deeply cleft, the lobes being more or less denticulate. Most of the teeth are very short, but a few are two or three cells long.

Although no antheridia were demonstrated in the material examined a few leaves were found which were evidently perigonial bracts. They occurred in small clusters of from one to three pairs and indicated that the male inflorescence, although at first terminal, soon became intercalary through proliferation. The bracts resemble ordinary leaves in most respects but are saccate at the base, the keel being arched. They also differ in the fact that the dorsal lobe, which covers over the basal pocket, is shorter than the others and suberect.

The production of gemmæ is an exceedingly common phenomenon in *S. scitulus*. They are borne on the apices of leaf-lobes, and sometimes a long succession of gemmiparous leaves may be observed. Eventually, however, the growth of the shoot is brought to an end and the last leaves produced remain rudimentary. Apparently the leaf-lobes are normally acute, and the blunt lobes which are so often present indicate that the leaves have been gemmiparous. The gemmæ themselves are golden-brown, angular bodies, with slightly thickened walls (FIG. 5). They are usually divided into two cells and measure 20–25 μ in length.

The gemmæ and leaf-cells of *S. scitulus* are very much like those of *S. exsectæformis*, although the trigones in the second species are not always well developed. In *S. exsectæformis*, however, there is a sharp disparity in size between the tooth-like dorsal lobe and the ventral lobe, while the latter, although sometimes shortly bilobed at the apex, is often acuminate and undivided. Explanate leaves bring out the differences between the lobes even more strikingly than leaves in their normal position on the stem and are in marked contrast to the leaves of *S. scitulus* with their three subequal lobes. Another close relative of *S. scitulus* is *S. politus* (Nees) Steph., which also is characterized by equally three-lobed leaves and by leaf-cells with conspicuous trigones. But the leaves in *S. politus* tend to be scattered along the stem, the lobes are blunter than in *S. scitulus*, and the leaf-cells are larger, measuring (according to Müller) 25-45 μ in the middle of the leaf and still more at the base. *S. politus* is widely distributed in Europe and is also cited in the literature from Greenland, Alaska, Ellesmere Land, Quebec, and British Columbia.

4. CEPHALOZIA FRANCISCI (Hook.) Dumort.

Collected in May, 1910, near Yarmouth, Nova Scotia, on earth along a roadside, by J. Macoun (*No. 41*). The second record for North America. The first record was based on specimens collected by Mrs. A. R. Northrup in the vicinity of Prospect Harbor, Maine, in August, 1902. These specimens were reported upon by Miss Haynes.[1] A third station for the species, also in Maine, was discovered by the writer at Eastport, in August, 1911. In northern Europe *C. Francisci* is widely distributed, although not abundant.

5. SCAPANIA PORTORICENSIS Hampe & Gottsche.

Collected in April, 1902, on Turquino Mountain, Santiago de Cuba, by S. H. Hamilton (*No. 5875*). The first record for the island of Cuba. The species was originally described from specimens collected by Schwanecke in Porto Rico but is now known also from Jamaica, Colombia, Ecuador, Bolivia, and Brazil. In Müller's Monograph of the genus *Scapania* the plant is described and figured in detail with a full synonymy.[2]

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[1] Torreya **3**: 40. 1903.

[2] Nova Acta Acad. Cæs. Leop. Carol. **83**: 150. *pl. 18*. 1905.

6. **Cololejeunea Camilli** (Lehm.) comb. nov. *Lejeunea Camilli* Lehm. Pug. Plant. **10:** 15. 1857. *Lejeunea* (*Colo-Lejeunea*) *Montagnei* Lehm.; Stephani, Hedwigia **29:** 96. 1890. Not *Lejeunea Montagnei* Gottsche, now *Euosmolejeunea Montagnei* (Gottsche) Steph. (FIGURES 6–14.)

Collected in July, 1903, near Mabess River, Jamaica, on living leaves, by the writer (*No. 280*). The determination is based on a fragmentary specimen in the herbarium of the British Museum, collected by Ule in Brazil (*No. 260*) and determined by Stephani as *Cololejeunea Montagnei*, a name which has never been formally published. The type specimen of *L. Camilli* is unknown to the writer, and the same thing is true of the type specimen of *L.* (*Colo-Lejeunea*) *Montagnei*. It should be noted, however, that both specific names were given by Lehmann, that both were applied to Cuban specimens obtained from Montagne, and that the original description of *L. Camilli* agrees in all essential respects with Stephani's description of *L.* (*Colo-Lejuenea*) *Montagnei*. It is probable that Lehmann first called the plant *L. Montagnei* in his manuscript and then, upon learning that the same name had already been applied to another species, altered the name in his published paper to *L. Camilli*, thus using the Christian name of Montagne instead of the surname. Apparently Stephani overlooked Lehmann's description and, upon recognizing the distinctness of the species, published it under Lehmann's original manuscript name. Unfortunately the writer has been unable to establish these ideas conclusively. According to Stephani the species occurs in Mexico as well as in Cuba, so that it is evidently widely distributed in the American tropics.

The Jamaican specimens referred to *C. Camilli* grow scattered or in depressed mats, the plants rarely overlapping. The stems are very delicate, measuring about 0.03 mm. in diameter, and are either simple or sparingly and irregularly branched, the branches spreading widely. The leaves are distant or contiguous and spread more or less from the axis (FIGS. 6–8). The lobes vary from ovate to lanceolate, tapering toward both base and apex and attaining a maximum size of about 0.7 x 0.25 mm. They are characterized further by being scarcely or not at all falcate and by having an entire margin and an acute or obtuse apex, usually tipped with a single cell (FIG. 10). The lobule is almost always reduced to a minute basal fold. When fully developed (FIG. 7) it is ovate and inflated and measures about 0.2 x 0.1 mm. Under these circumstances the apical tooth consists of a single cell with a hyaline papilla at its base but on the inner surface (FIG. 11). The cell is in direct union with three cells of the lobule, one of which is connected also with the blunt proximal tooth, usually consisting of two projecting cells side by side. The leaf-cells average about 14 μ along the margin of the lobe and 25 x 14 μ in the median and basal regions. The walls are everywhere thin and destitute of trigones.

The inflorescence seems to be constantly dioicous. The female flower terminates the main stem or a leading branch and innovates on one side (FIG. 6), the innovation apparently continuing the female axis and sometimes bearing a second archegonium. In rare cases two subfloral innovations are produced.

The bracts spread obliquely and are complicate with a sharp but wingless keel. The lanceolate lobe measures about 0.45 x 0.14 mm., the apex is acute or obtuse, and the margin is either entire or shows one or two projecting cells. The lobule is ligulate or linear, about 0.17 x 0.05 mm., and shows, in normal cases (FIGS. 12, 13), an apical tooth composed of two superimposed cells and a sharp proximal tooth; these peculiarities, however, are often poorly brought out. The perianth (FIG. 6) is obovoid and measures about 0.6 mm. in length by 0.25 mm. in diameter. Although terete in the lower part it is indistinctly five-keeled toward the apex, the keels being usually reduced to short rows of projecting cells; otherwise the surface is smooth. The apex is truncate and the beak is short and often indistinct. The male inflorescence is terminal on the stem or on a leading branch, and no cases of proliferation have been observed. The monandrous bracts are mostly in from three to ten pairs and become separated with age (FIG. 9). They resemble the leaves but are smaller and have a more strongly inflated lobule. The capsule is about 0.15 mm. in diameter, and the spores, which are greenish and scarcely roughened, are about 8 μ wide.

Vegetative reproduction is carried on by means of discoid gemmæ, which are alluded to in Lehmann's original description. They are produced in considerable abundance and conform closely to the type found in other members of the genus. A mature gemma (FIG. 14) shows that the apical quadrants cut off only two segments apiece. Each half consists of eight cells, there are three organs of attachment, and usually five of the marginal cells project.[1]

Most species of *Cololejeunea* are exceedingly variable, and *C. Camilli* is no exception to this rule. The variability shows itself particularly in the form and size of the leaf-lobes and in the degree of complexity which is attained by the lobules. Much of this is due simply to arrested development, but, since this condition sometimes persists in male plants until the formation of antheridia, it cannot be left wholly out of consideration. In one case, for example, a plant growing from a gemma produced a few rudimentary leaves and then, without branching, formed a short antheridial spike of the usual type, thereby terminating its growth. The female plants seem invariably to reach a higher stage of development than the male plants, but even in these the lobules are usually represented by minute basal folds and the lobes fall short of reaching the maximum size.

One of the closest allies of *C. Camilli* is *C. diaphana* Evans,[2] originally described from Florida but since detected in material from Porto Rico.[3] This species grows on both bark and leaves. It is even more delicate than *C. Camilli*, its leaves are somewhat smaller, measuring about 0.45 x 0.2 mm. in maximum size, and the margins of the lobes are minutely crenulate or denticulate from projecting cells. It differs further in its autoicous inflorescence and in

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[1] For a recent account of the genus *Cololejeunea* and its gemmæ, see Evans, Bull. Torrey Club **38:** 251–286. *pl. 11, 12.* 1911.

[2] Bull. Torrey Club **32:** 184. *pl. 5, f. 9–14.* 1905.

[3] Bull. Torrey Club **38:** 259. *text-fig. 1, F.* 1911.

its denticulate bracts. The gemmæ in *C. diaphana* are somewhat more complex than in *C. Camilli*, each half being composed of ten or twelve cells and each apical quadrant cutting off three or four segments. In other respects the gemmæ are much the same, each kind showing three organs of attachment and projecting marginal cells.

7. LEJEUNEA SPINILOBA Lindenb. & Gottsche; G. L. & N. Syn. Hep. 770. 1847.

Collected in September, 1910, at San Diego de los Baños, Pinar del Rio, Cuba, on limestone rocks, by N. L. Britton, F. S. Earle, and C. S. Gager (*No. 6722*). New to the West Indies. The species was based on specimens collected by Liebmann at Colipa, Vera Cruz, Mexico. In 1890 it was found by C. G. Pringle at Tamasop, San Luis Potosi, Mexico. No other stations have been reported. In the original description of this interesting species only the vegetative organs are alluded to. Later, however, Gottsche added an account of the bracts and perianths.[1]

The most striking feature about the plant is the lobule. Instead of being in the form of a short inflated sac, as is usual in the Lejeuneæ, it is a slender and plane lamina, ligulate to lanceolate in outline and extending parallel or nearly so close to the axis. It is sometimes straight but is often more or less curved with the concavity turned toward the axis. When well developed the lobule, which measures about 0.35 x 0.06 mm., is mostly fifteen to eighteen cells long and three or four cells wide throughout the greater part of its extent. It tapers somewhat toward the apex, which is commonly tipped by two cells side by side, more rarely by a single cell. The hyaline papilla is apical in position. In poorly developed plants the lobule may be only two cells wide. The lobe measures about 0.7 x 0.55 mm.; it spreads widely from the axis and is broadly ovate and entire with a rounded apex. The leaf-cells, which are about 25 μ in diameter in the middle of the lobe, have thin walls with minute and indistinct trigones. The underleaves measure about 0.35 x 0.15 mm. They are distant, narrowly ovate, and sharply bifid for about half their length with erect lanceolate divisions. In the perichætial bracts the lobules are usually five or six cells broad and are more sharply pointed than in the leaves, the apex being commonly tipped with two superimposed cells. The perianth is five-keeled, the dorsal keel being short and low.

A close relative of *L. spiniloba* is *L. pililoba* Spruce,[2] a species now known from southern Florida and from several of the West Indian Islands. In this plant the lobule is filiform and consists of a single row of cells throughout most of its length. Here, as in *L. spiniloba*, the hyaline papilla is situated at the apex. The generic position of these two species is a matter of some doubt. At one time the writer regarded *L. pililoba* as a member of the genus *Cheilolejeunea*.[3] Afterwards, however, he proposed that this genus should be defined in a narrower sense than heretofore,[1] one result being that *L. pililoba* would now have to be excluded from it. On the whole it would perhaps be wisest for the present to retain both *L. pililoba* and *L. spiniloba* in the genus *Lejeunea.*

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[1] Mex. Leverm. 213. 1863.

[2] Jour. Linn. Soc. Bot. **30**: 346. *pl. 23, f. 6–8.* 1894.

[3] Mem. Torrey Club **8**: 147. 1902.

8. MICROLEJEUNEA RUTHII Evans, Mem. Torrey Club **8**: 161. *pl. 21, f. 11–19.* 1902.

Collected in September, 1910, in the vicinity of Highlands, North Carolina, on the bark of hemlock and *Kalmia,* by A. H. Graves. Heretofore known only from Big Frog Mountain, Tennessee, the type locality. Most of the North Carolina material represents a juvenile condition of the plant, in which some of the specific characters are not clearly manifested. On many of the shoots, for example, the lobes of the leaves are only a little longer than the lobules, and the divisions of the underleaves are only two cells wide at the base. Fortunately a careful search brought to light several stems in which the lobes were about twice as long as the lobules, while the divisions of the underleaves were four cells wide at the base, agreeing in these important respects with typical forms of the species. If it had not been for the presence of these better developed plants the determination of the specimens would have been doubtful, since the juvenile conditions of the various species of *Microlejeunea* sometimes approach one another very closely. The plants growing on hemlock were accompanied by *Frullania Asagrayana* Mont., a sterile *Radula,* and a poorly developed *Plagiochila.*

9. BRACHIOLEJEUNEA DENSIFOLIA (Raddi) Evans, Bull. Torrey Club **35**: 158. 1908.

In Spruce's account of the Hepaticæ collected by W. R. Elliott on the islands of St. Vincent and Dominica, he cites the present species, which is commonly called *B. bicolor* (Nees) Schiffn., from Fancy Farm, St. Vincent, basing his record on a portion of No. 343.[2] In examining the material preserved under this number in the herbarium of the British Museum the writer found only *B. corticalis* (Lehm. & Lindenb.) Schiffn., a species which Spruce does not list at all. Apparently he confused the two species, which certainly resemble each other in many respects. There is therefore no adequate evidence that the true *B. densifolia* has been collected in the West Indies, since the specimens collected by Wright in Cuba and distributed in the Hepaticæ Cubenses under the name *Phragmicoma bicolor* clearly belong to *B. insularis* Evans.[3] There still remain, however, a few North American records for the species, based on specimens collected in Mexico, and some of these at least appear to be correctly determined. In South American *B. densifolia* is widely distributed.

10. PTYCHOCOLEUS TORULOSUS (Lehm. & Lindenb.) Trevis.

This South American species, also, is reported by Spruce from Fancy Farm, St. Vincent, under the same number as the preceding species. In the British

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[1] Bull. Torrey Club **33**: 1. 1906.

[2] Jour. Linn. Soc. Bot. **30**: 336. 1894.

[3] Bull. Torrey Club **35**: 159. *pl. 6.* 1908.

Museum a special packet enclosed in No. 343 is labeled *Acrolejeunea torulosa*, the name under which Spruce distributed the species in his exsiccatæ. This special packet, in the writer's opinion, likewise contains nothing but *Brachiolejeunea corticalis*. If this determination is accepted there remain no North American records for *P. torulosus*, and the only member of the genus definitely known from north of Panama is *P. polycarpus* (Nees) Trevis., recently described and figured by the writer.[1]

[1] Bull. Torrey Club **35**: 162. *pl. 7, f. 1–11.* 1908.

YALE UNIVERSITY

NOTES ON NORTH AMERICAN SPHAGNUM, III

A. LEROY ANDREWS

The Subgenus Inophloea Russow (concluded)

The four species previously treated stand out very definitely and may be considered as taxonomically conclusive; the remaining species of the subgenus are much less understood in their relations on the one hand to *S. palustre*, on the other to each other, as the extensive synonymy of comparatively recent date will readily show. Their foremost common characteristic is found in the chlorophyll cells of the branch leaves, which with a central lumen are usually equally exposed on both surfaces or on neither; there is rarely a greater or exclusive exposure on the inner surface, but the section with the characteristic central lumen shows where the plant belongs. For the rest there is a notable tendency to a reduction of pores in the outer walls of the cortical cells of the stem, in which point as in other minor particulars the remaining species of our group show a somewhat closer relationship to *Litophloea*.

5. *Sphagnum papillosum* Lindberg, 1872. This species is in typical specimens recognizable by the papillose inner walls of its hyaline leaf cells, the papillæ being of course confined to the part of the wall immediately overlying the chlorophyll cells. If one is using high magnification with good light, he will note the papillæ on viewing the inner surface of the leaf; they are also in evidence in a transverse section, but can be best observed in a longitudinal one. The chlorophyll cells themselves are normally more or less barrel-shaped in section, usually exposed on both surfaces, and have a central elliptical lumen and thick walls. The most essential features of the species were all well brought out by Lindberg in the original short diagnosis.[1] Others were noted by Russow:[2] the cortical cells of the stem have their fibrils much reduced or almost entirely lacking, the fewer pores (especially often 2) of the outer cortical cells are small, usually round and very clearly defined, as is shown in Braithwaite's plate,[3] the stem leaves are relatively broad in comparison to their length and

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[1] Contributio ad floram cryptogamam Asiæ boreali-orientalis 280. 1872.

[2] Zur Kenntn. d. Subsec. u. Cymbif. Gruppe europ. Torfm. 117 ff. 1894.

[3] Sphagnaceæ of Europe and North America *pl. IV, fig. 9c.*